Nova Scotia

Department of
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MARINE TRANSPORT STUDY FOR NOVA SCOTIA

BY

Leslie MacIntyre Maritime Associates Inc.
Marine Consultants
Baddeck, Nova Scotia
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TABLE OF CONTENTS

PAGE

INTRODUCTION.....1

1. GEOGRAPHICAL CONSIDERATIONS.....2

1.1 Climatology.....2
1.2 Ice Conditions.....3

2. NOVA SCOTIA PORTS.....6

2.1 Physical Features.....6
2.2 Regulatory Control.....7
2.3 Pilotage.....11

3. BULK COMMODITIES TRANSPORT.....13

3.1 Solid Materials Handling.....13
3.2 Stockpiling and Reclaiming.....13
3.3 Shiploaders.....14
3.4 Ship Size Considerations.....16
3.5 Ship Type.....19
3.6 Ocean Transport.....20
3.7 Methods of Transport.....21

4. TRENDS IN MARINE FREIGHT MARKETS.....22

4.1 Freight Rate Trends.....22
4.2 World Fleet Trends.....26
4.3 Backhaul Potential.....26
4.4 Trends in Summary.....27

LIST OF TABLES

PAGE

Distance Tables
From Sydney.....28
From Strait of Canso.....29
From Halifax.....30

Wharfage Charges.....32

Storage Charges.....33

Berthage Charges.....34

Utilities And Miscellaneous Charges.....36

Atlantic Pilotage Authority Rates
And Fees For Nova Scotia.....37

INTRODUCTION

INTRODUCTION

The potential for industrial mineral development in Nova Scotia is expansive as the province is geographically well-positioned to access the expanding export markets. Consequently, market costs must consider transportation costs which in some instances may be so high as to exceed the cost of production of some commodities. This study examines the major components of marine transport in relation to Nova Scotian industrial minerals including: aggregates, armour stone, building stone, cement, flyash, gypsum and anhydrites, limestone and dolomite, marble chips, salt, silica, and peat moss.

The elements of marine transport identified and described herein are not meant to be exhaustive nor all inclusive. Each transport project must be evaluated on its individual merits giving due regard to the production and transport peculiarities of the product in question.

Information given in this study is believed to be accurate at the time of writing, but as many of the elements are subject to change, this information should be used as a guide only. Data and figures included represent reconstructed data developed from extensive input parameters which were then reduced to an elemental resultant form. Most values are given in the units common to the trade under discussion. For example, ship dimensions are presented in imperial units, while weights are mostly metric. Currency values are primarily United States dollars (USD).

Nova Scotian producers of the commodities under consideration, through careful planning and control of their after-production costs (including transportation costs), are physically in a position to access the markets of the world given their strategic marine transport location.

1. GEOGRAPHICAL CONSIDERATIONS

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1.1 CLIMATOLOGY

The climate of Nova Scotia is continental, being influenced by the easterly moving air masses of the North American continent. The marine influence moderates seasonal extremes of temperature and gives rise to prevalent coastal fog. The Atlantic coast is particularly stormy in winter.

The following illustration outlines seasonal meteorological conditions. (The data is based on Sydney, Nova Scotia.)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (Daily Mean °C)	-4.7	-5.9	-2.5	2.0	7.4	13.2	17.7	17.6	13.5	8.4	3.8	1.8	5.7
Rainfall (mm)	76.0	57.0	66.6	74.5	89.4	82.0	81.4	101.3	87.2	120.0	148.1	99.0	1082.5
Snowfall (cm)	74.5	68.6	63.9	25.4	5.3	--	--	---	--	2.6	12.0	65.6	1399.9
Days with:													
Rain	8	6	8	10	13	13	12	13	12	14	15	11	135
Snow	16	14	13	7	1	*	0	0	0	1	5	16	73
Precipitation	20	16	17	14	14	13	12	13	12	15	18	22	186
Fog	4	4	7	8	11	10	11	6	5	5	5	4	80
Wind													
% N	10.1	12.3	17.8	17.9	16.6	12.3	7.3	7.8	10.2	10.6	10.1	10.4	12.0
NE	5.3	6.0	8.1	8.0	7.8	6.6	4.7	4.5	5.4	5.3	6.2	5.5	6.1
E	6.4	5.6	7.0	7.1	7.6	6.2	5.3	5.0	4.8	4.7	6.3	5.3	5.9
SE	5.2	5.4	5.2	6.7	6.8	6.7	6.3	6.5	4.6	6.5	6.3	6.7	6.1
S	11.4	11.1	11.8	13.3	17.6	21.1	24.2	20.1	17.2	16.3	15.8	12.5	16.0
SW	18.7	17.6	15.8	16.2	19.1	27.4	31.4	31.2	27.0	24.4	19.5	20.6	22.4
W	27.1	26.0	18.4	15.6	11.4	10.4	12.6	15.7	17.7	18.5	21.7	24.3	18.3
NW	14.3	14.0	14.2	13.1	11.1	6.7	5.2	6.5	10.4	12.1	12.2	13.0	11.9
Calm	1.5	2.0	1.7	2.1	2.0	2.6	3.0	2.7	2.5	1.6	1.9	1.7	2.1
Mean Speed (knots)	13.2	12.9	13.0	12.0	11.4	10.8	10.0	9.9	10.4	11.5	12.4	12.9	11.7

* - average of less than one but greater than zero

1.2 ICE CONDITIONS

Monitoring

The Canadian Government, through Environment Canada, monitors and forecasts ice conditions in the Gulf of St. Lawrence and coastal waters of Nova Scotia during the ice season. The observations are based on satellite information, vessel observations, aerial reconnaissance, and shore-based monitoring. Ice information is made available to marine interests by daily radio forecasts, and forecasts with ice charts by weather facsimile transmission as well as by publication.

The Canadian Coast Guard monitors ice conditions and ice breaking activities from its Ice Operations Offices in Halifax and will relay ice information to vessels in the area upon demand free of charge. International ice conditions and iceberg information in the Northwest Atlantic is available from the International Ice Patrol, U.S. Coast Guard Base, Avery Point, Graton, Connecticut.

Ice information services are seasonal and cease with the end of normal ice season.

Ice Conditions Generally

Ice usually forms in the Gulf of St. Lawrence in early January and persists until late April or early May restricting navigation to ice-classed vessels. Ice driven by strong westerly winds drifts past Sydney, Scatarie Island and southwest as far as the Strait of Canso. As long as the wind is offshore (westerly), the coast will remain open. The severity of the ice depends on wind and temperature conditions.

Ice seldom halts navigation from Scatarie westward with occasional interruptions from Scatarie to Cape North. The Gulf of St. Lawrence region is impaired by ice from January until late April.

Ice Conditions - Nova Scotia Coast

Bay of Fundy: Minimal ice formation due to strong tidal currents and water turbulence. Chignecto Bay and Minas Basin do develop some ice during winter months, but it is usually of brief duration.

Bay of Fundy to Halifax: Generally ice free although some new ice does form in bays and harbours, but it seldom hinders navigation.

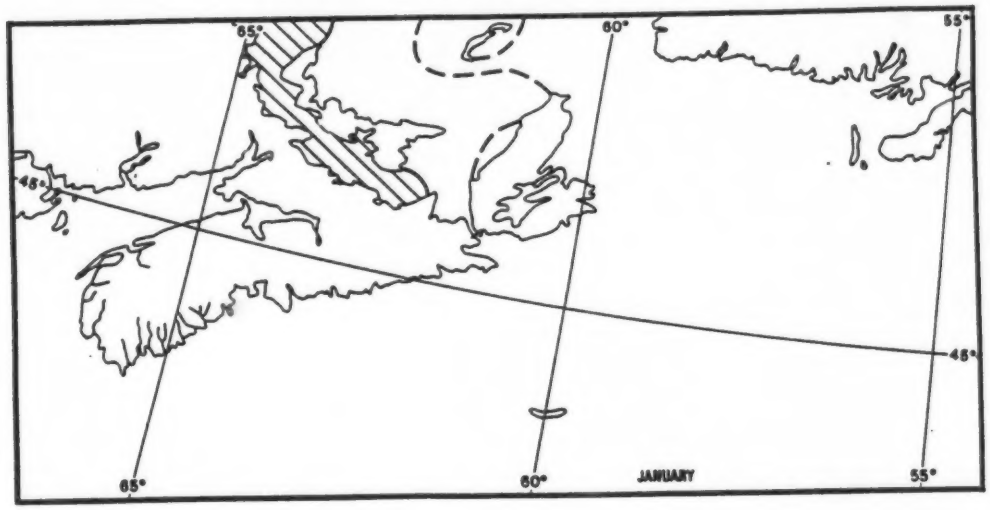
Halifax to Canso: Generally ice free although new ice may form in harbours and bays. Pack ice from the Gulf of St. Lawrence may occur in this area between mid-February and early May. This ice is not persistent, usually opening up after a few days, but is more persistent toward the eastern portion.

Canso to Cape North: Sea ice from the Gulf of St. Lawrence moves through the Cabot Strait with westerly winds, and if followed by north and easterly winds, can congest the area and impede or interrupt shipping. Extreme conditions in the Sydney bight area caused by ice pressure stop icebreaker service but such situations are infrequent and of short duration.

Cape North to New Brunswick (Cape Tormentine) and Northumberland Strait: Ice begins to form in early January and persists until early May. Current, winds and tidal action in combination keep some water open which can be used for navigation.

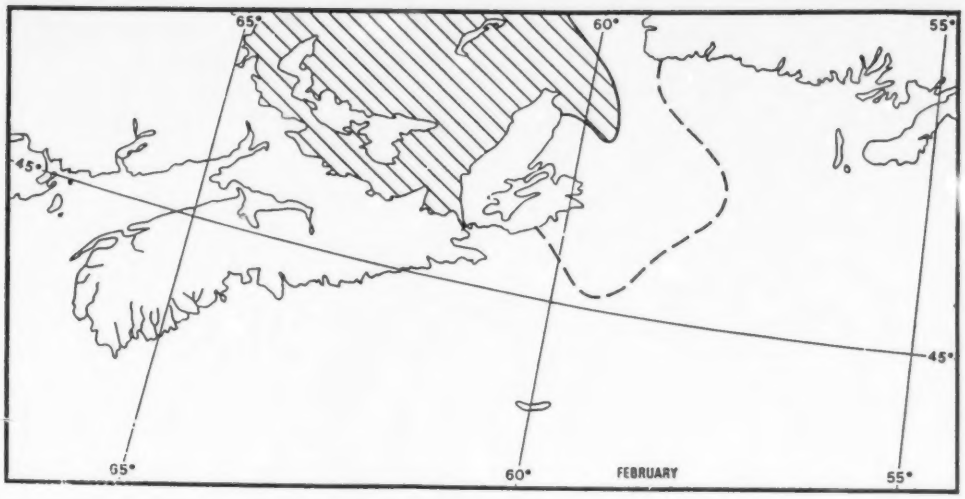
Extent of Sea Ice:

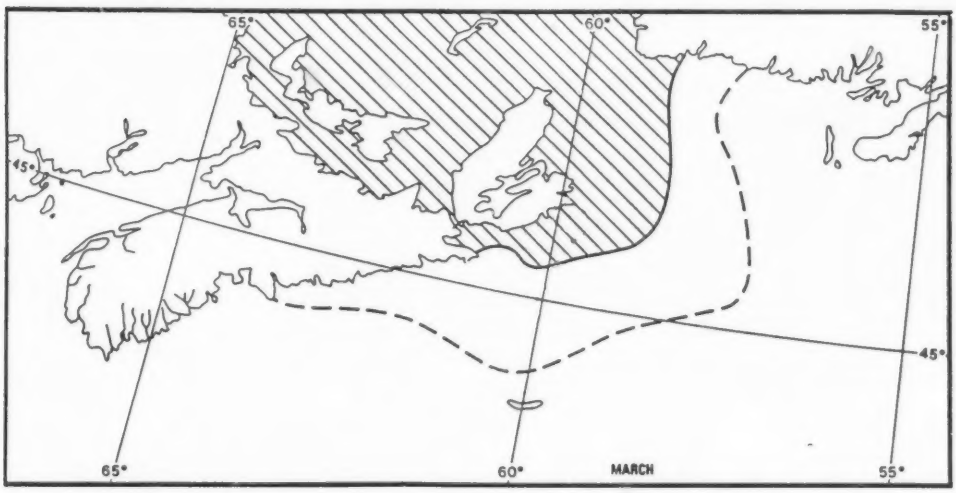
(1964-1979)

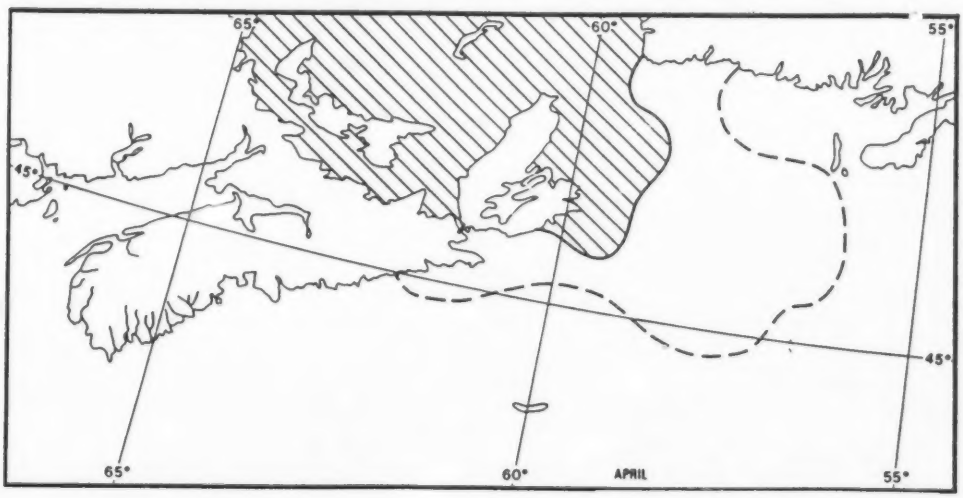


AVERAGE LIMIT ————————

MAXIMUM LIMIT — — — — — —







AVERAGE LIMIT ——————

MAXIMUM LIMIT — — — — — —

2. NOVA SCOTIA PORTS

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2.1 PHYSICAL FEATURES

Physical features of ports and approaches in and around Nova Scotia are subject to change. Surveys to determine physical features are carried out on a continuous basis by the Canadian Hydrographic Service, Fisheries and Oceans, which publishes Nautical Charts, Sailing Directions, Small Craft Guides, and Tide Tables. Current issues of those publications should be consulted for reference to physical features of harbours and approaches as well as other data of marine significance in and around Nova Scotia.

The above publications are readily available from most ship chandler and ship supply outlets, licenced distributors, and from:

Canadian Government Publishing Center
Supply and Services Canada
Hull, Quebec CANADA K1A 0S9

or

Canadian Hydrographic Chart Distribution Office
Fisheries and Oceans
P.O. Box 8080
1675 Russel Road
Ottawa, Ontario CANADA K1G 3H6

2.2 REGULATORY CONTROL

The construction of wharf and load-out facilities, including alterations, requires the approval of numerous government (federal, provincial, municipal and local) regulatory bodies.

Navigable Waters Protection Act

Freedom of navigation in navigable waters in Canada is a public right predating confederation which is protected by the "Navigable Waters Protection Act"(NWPA). Any work in, on, or over such waters must be approved by the Minister of Transport.

The definition of work encompasses a broad category of activity and includes ".....bridge, boom, dam, wharf, dock, pier, tunnel or pipe and the approaches or other works necessary or appurtenant thereto, any dumping of fill or excavation of material from the bed of a navigable water.....power cable or wire.....any structure, device or thing.....that may interfere with navigation."

The Act, administered by Transport Canada through the Canadian Coast Guard, outlines a procedure whereby approval is given to a pending project. An application under the NWPA should include:

(i) a description of the work (including plans with dimensions and cross sections of sufficient scale to enable the reviewing officers to appraise the proposal) (10 copies);
(ii) site plan (10 copies);
(iii) construction scheduling and projections.

As the NWPA is concerned with "navigable waters" application submissions under the Act and regulations relate to activity below (to seaward of) the high water mark above the water, in the water and in the seabed. Details of the application requirements are given in a guide prepared by Transport Canada, available through the Canadian Coast Guard entitled "Navigable Waters Protection Act Application Guide" (TP2495).

The Aids and Waterways Branch inspector then inspects the proposed site and determines all interested parties including the Atlantic Pilotage Authority, Ports Canada, interested government agencies, groups, and persons. A copy of the application is then forwarded to Environment Canada, Fisheries and Oceans and any other departments which may have an interest.

The Coast Guard officials may then take one of two routes:

(i) grant an "exemption" which essentially declares that the project does not constitute an impediment to navigation and consequently is exempt from the Act. (A bridge, dam, boom, and causeway are excluded from exemptions and must follow the approval route.)

(ii) pursue the approval route whereby the plans are submitted to Ottawa, followed by two advertisements placed in the Canada Gazette, and if no complaints are lodged within 30 days regarding interference with navigation, an approval document is usually issued which is valid for work commencing within three years thereafter.

The approval is not a general federal government approval nor does it convey any property or possessory right to the applicant. This approval document is only an authorization to interfere with the public right to navigation for a specified period of time.

	Type of Work	Period of Time Approval Valid
1.	Bridge (wood, trestle type)	25 years
2.	Boom	25 years
3.	Causeway	35 years
4.	Terminal Facilities	30 years
5.	Breakwalls - Fill	30 years
6.	Artificial Islands	10 years
7.	Marina Facilities	30 years
8.	Aquaculture and Fish Rearing Facilities	3 years
9.	Cables	30 years
10.	Any work not listed in items 1 to 9	50 years

Reapplication for a further approval period may be made as the time of expiry approaches.

Waterlots: Leases and Licenses

Lands comprising the seabed abutting the high water mark are held by the Government of Canada. (Some exceptions do exist.)

Applications for waterlot leases or licences are made to Transport Canada (Harbours and Ports Division of the Canadian Coast Guard) and must include:

-Name, address and occupation of the applicant.

-A tracing and 10 prints of the waterlot with metes and bounds

description, prepared and sworn by a duly qualified land surveyor. The plan should have on it an index plan showing the location of the waterlot in the harbour, and should be related to the official registered plan of the land upon which the waterlot applied for abuts. The plan should be suitable for enclosing in a lease document.

-A sworn statement as to what the waterlot is to be used for and the cost of the proposed works to be constructed thereon. (It will be noted that the importance and extent of the works in question will have a distinct bearing on the consideration of the application.) The statement referred to above will not be subject to revision and will be made a condition of any instrument that may issued.

-Proof that the title to the land on which the waterlot fronts is vested in the applicant. If the applicant is not the riparian owner, the application will not be considered without the consent in writing of the riparian owner.

-The consent in writing of the mortgagee, if the land lot is mortgaged.

-A guarantee to pay the charges of the Department of Justice for searching the title to the property, should a title search be considered necessary.

Applications must also include:

(a) Letter of Patent of Incorporation or Declaration of Partnership;
(b) Address of Head Office or place of business;
(c) If the applicant is a company, a duly passed resolution authorizing the agreement contemplated, as well as the name of the person who is to sign on behalf of the company; or if a partnership, a power of attorney duly approved by other members of the partnership, authorizing the agreement contemplated, as well as the name of the person who is to sign on behalf of the partnership.

<u>Wharfs, Load-out Facilities and Environmental Concerns:</u>

Environment Canada must be satisfied the project will comply with the provisions of:

-The Environmental Contaminants Act
-The Clean Air Act
-The Ocean Dumping Control Act
-The Fisheries Act (Section 33)
-The Migratory Birds Act
-The Transportation of Hazardous Goods Act

Environment Canada scrutinizes construction beyond the high water mark and will evaluate the proposed project with respect to: (i) the accumulative impact of the wharf or facility in relation to the density of wharfs and activity in the particular area, (ii) the impact on other users of the locale, (iii) the products to be used in the construction including the impact of material aging.

Dredging is strictly controlled. Environment Canada may require siltscreening, and may limit activity and spoil disposition to certain tidal phases. The environmental impact of the dredging as well as disposition of the spoils is carefully scrutinized.

Bulkhandling and storage will also be evaluated for ground water and run-off controls. Consequently, stockpile pads may require sealing as well as the provision of leachate collection and treatment facilities.

Port Administration and Control

In Canada, Shipping and Navigation are within the jurisdiction of the federal government. The regulation and administration of ports was redefined in a more workable fashion by the Canada Ports Act, 1982 which was directed to further the social and trade objectives of Canada through equality of access to Canadian port users. "...the responsibility of the Minister is to ensure the integrity and efficiency of the national ports system and the optimum deployment of resources...." The Act was designed to ensure the efficiency and integrity of the Canadian ports system and compatibility with the modes of transport in use as well as being complementary to other marine activities. The Act creates several levels of ports:

(i) local port corporations at major ports;
(ii) those remaining ports administered by Canada Ports Corporation;
(iii) ports administered by Fisheries and Oceans (Small Craft Harbours Branch).

The local port corporations are financially independent bodies with full or part time paid directors, their own set of by-laws with powers to establish and collect fees and tolls on ships and cargos, as well as to charge fees and tolls for storage and services. They are also empowered to engage in the management and operation of the port.

Nova Scotia Port Administration:

(i) Local Port Corporations - Halifax - Halifax Ports Corp.

(ii) Transport Canada - Baddeck
Bridgewater
Country Harbour
Digby
Hantsport
Iona
Mulgrave
New Glasgow
Parsboro
Pictou
Port Hawkesbury
Port Medway
Pugwash
Sheet Harbour*
Sydney
Weymouth
Yarmouth

(iii) Fisheries and Oceans - Canso
Isaac's Harbour
Liverpool
Lockport
Louisbourg
Lunenburg
Port Medway

*A common user wharf has recently been constructed in Sheet Harbour by the Province of Nova Scotia. Details concerning this facility are available from the Department of Development, Province of Nova Scotia in Halifax.

2.3 PILOTAGE

The Atlantic Pilotage Authority is responsible for pilotage in and around the province of Nova Scotia. Pilotage is compulsory in the following areas:

Halifax
Strait of Canso
Sydney/North Sydney
Bras d'Or Lakes
Pugwash

Local pilots are available upon request in the following areas:

Hantsport
Digby
LaHave River
Liverpool
Lunenburg
Mahone Bay
St. Margaret's Bay
Shelburne
Eastern Shore from Halifax to Canso
Pictou

Pilotage fees are determined by the application of a formula which ascertains the "unit" which a vessel constitutes. The unit is the product of the vessel's length, width and depth divided by 283.17.

Rates and fees for each area in and around Nova Scotia are given in the table on page 37.

The Atlantic Pilotage Authority is empowered to prescribe rates and fees as well as change existing rates and fees. Therefore, the table should be used only as a general guide. Specific rates and fees in force at a particular time should be obtained from:

Atlantic Pilotage Authority
Suite 1203
Bank of Montreal Tower
Halifax, Nova Scotia
B3J 1M5
Tel: (902) 426-2550

3. BULK COMMODITIES TRANSPORT

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The material which follows applies to commodities such as aggregates, building stone, cement, flyash, gypsum and anhydrite, limestone and dolomite, marble chips, salt, silica and peat (bulk). Armour stone in smaller sizes is included.

3.1 SOLID MATERIALS HANDLING

Products in this category have properties which identify them as being sufficiently free flowing as to assume the shape of a container or space in which they are deposited. These materials are handled pneumatically, mechanically or in some cases, as a free flowing liquid.

Marine terminals and loadout facilities usually serve to interface two or more modes of transport - a land based delivery system with continuous or semi-continuous flow and a marine system with batch movements. This intermodal characteristic applies even where the product source is located proximate to the loadout or at tidewater as stockpiling is required. As the interfacing delivery modes usually possess different delivery volumes, some sort of surge capability is required at the point of interface. Simple stockpiling is the most common solution. Materials which do not require weather protection can be stockpiled near the loadout in an exposed fashion. This method must take into consideration: loss of fines due to wind, environmental pollution, containment and disposal of leachate, degradation of product properties and mass, pilferage, security requirements and social concerns. Weather protected stockpiling avoids many of these concerns but is costly and limits access especially for machinery. A common method used in the coal shipping areas is rail car stockpiling where loaded rail cars are held in nearby rail yards and discharged directly to the loadout system. This system is used in Norfolk, Virginia but requires continuous or nearly continuous loadout and large volume movements to be cost effective. Barge stockpiling is similar to rail car applications.

3.2 STOCKPILING AND RECLAIMING

In its simplest form, a front-end loader feeds the loadout hopper directly from the stockpile. This application is well suited to low volume handling and intermittent handling especially where

on-site loaders primarily used in other applications are available. Efficiency is based on the loader capacity, cycle time, and material characteristics. Additional loaders can be added until congestion occurs or the conveyor capacity is attained. Disadvantages to be considered include loader congestion, requirements of stockpile/hopper maneuvering space, weather limitations on the loader operation, and diminished capacity as stock-pile/conveyor/hopper distance increases as the stockpile decreases.

Another system commonly employed when long term, continuous fed stockpiling occurs is the stockpile tunnel conveyor where a tunnel or number of tunnels equipped with conveyors are located under the stockpile area and in turn feed the ship loader. Material is supplied by gravity through remotely controlled gates over the conveyor tunnels. This system is simple and highly cost effective where the stockpile operation will span a term of many years. It is limited by the material's gravity flow characteristics and propensity for bridging or "hanging-up". This system requires a stockpile overhead conveyor or stacker either permanent or portable.

Another variant is the rail mounted stacker/reclaimer. This system is common in iron ore, heavy concentrates, and coal handling as one unit is capable of servicing numerous stockpiles and integrated conveyor systems.

3.3 SHIPLOADERS

Shiploaders must be positioned to load and trim the vessel. Loaders vary from fixed boom types to highly mobile units. The latter move along the dock having extendable booms which are capable of being hoisted or lowered as the vessel's air draft varies or slewed to access different areas of the holds. This latter type has the advantages of high volume continuous loading, trimming capability and the capacity to load vessels with minimum movement and is not restricted as to the size of hold worked.

The arc or quadrant loader offers moderate cost in loader expenditure and wharf construction. It usually consists of a centralized wharfhead on which the loader is positioned and which also provides access to the ship. Dolphins at the ends of the face serve as the berth face extension and bollard bases. The entire structure may be supported by frictional piling structures. Dual quadrant loaders increase the discharge reach sufficiently to load vessels of about 35,000 dwt. without shifting the ship.

SHIPLOADERS: SYSTEMS COMPARISONS

Fixed System

Advantages	Disadvantages
-least costly	-loading must cease to move vessel
-simple to operate	-longer docks as vessel must have room to be repositioned
-simple wharf structure	-slow vessel trimming
-single operator	-restricted as to hold area access especially with large holds
-minimum maintenance	

Travelling System

Advantages	Disadvantages
-continuous loading of stationary vessel	-high initial capital costs
-efficient vessel trimming	-high maintenance costs
-access to all hold areas	-expensive dock requiring heavy localized loading strength to accommodate loader and track
-capability to load large holds	

Arc System

Advantages	Disadvantages
-simple wharf structure	-requires ship movements for large vessels
-minimum ship movements	-arc tracks congest dock approaches
-ability to reach numerous holds from single vessel position	
-moderate initial and maintenance costs	

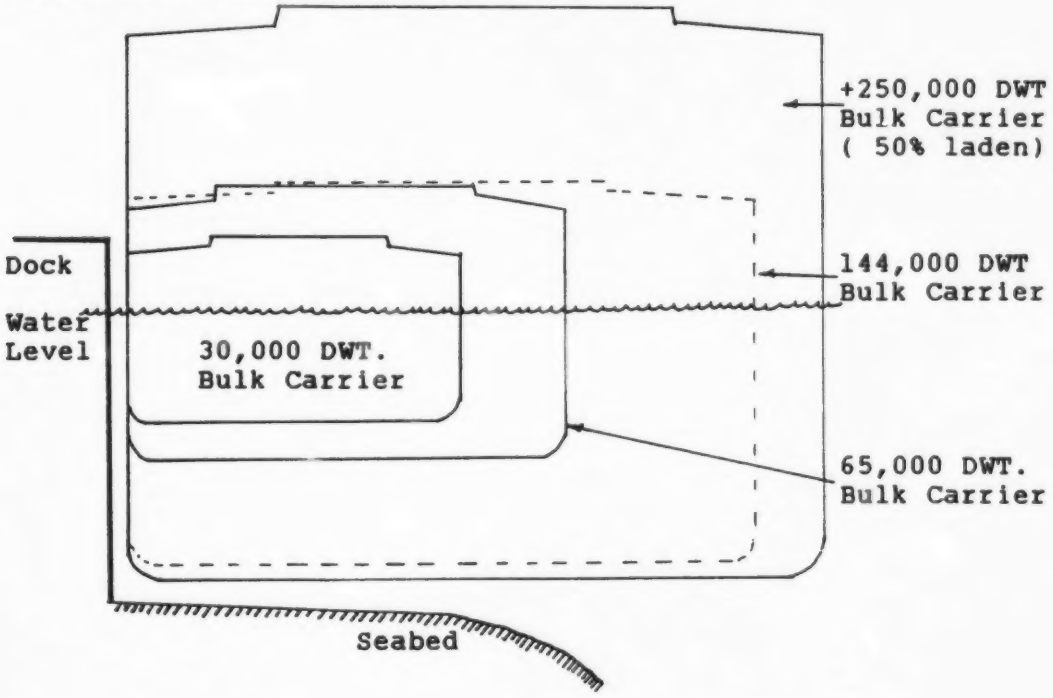
3.4 SHIP SIZE CONSIDERATIONS

Generally, the optimum size ship is directly related to the length of the product movement and the speed of material handling. Any formulation aimed at determining the optimum size ship must consider a multiplicity of specific interdependent factors such as port limitations, canal restrictions, and route restrictions. Although large ships are more economical on a tonne/mile basis while in transit, increased ship size affects collateral handling costs such as stockpiling, storage and inventory costs, finance costs, and those costs arising from the product's susceptibility to changes in the market elements.

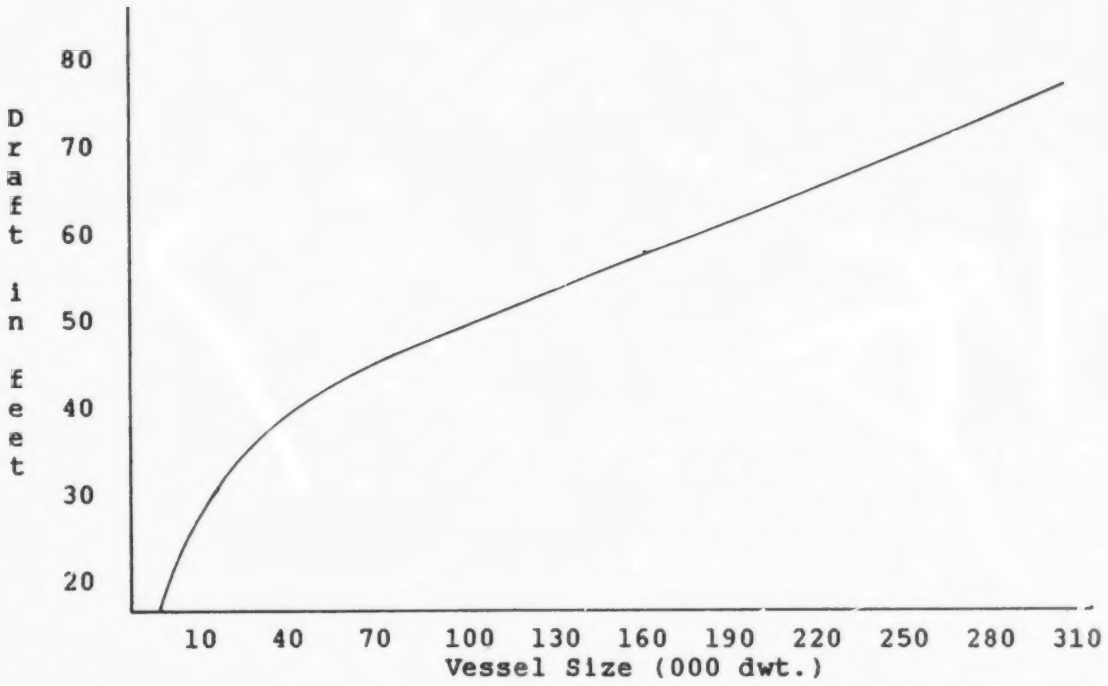
Port Limitations

The following illustration demonstrates physical limitations of ports and facilities handling dry bulk products.

Vessel Cross-sectional Comparison



Draft-Vessel Size Comparison



Physical limitations apply equally to the port approaches and channels which may well have restrictions. For example, although Sydney (south arm) has mid-channel depths of 50 feet, the controlling depths in the approaches are 38 feet. Additional vessel size determinants result from the configuration of the approach channel which might have abrupt course alterations and dog-legs. An example is the approach to Pugwash. Turning basin size is another determinant as the vessel must be turned after arrival in order to depart when loaded. Loadout facility features also limit vessel size and were discussed previously.

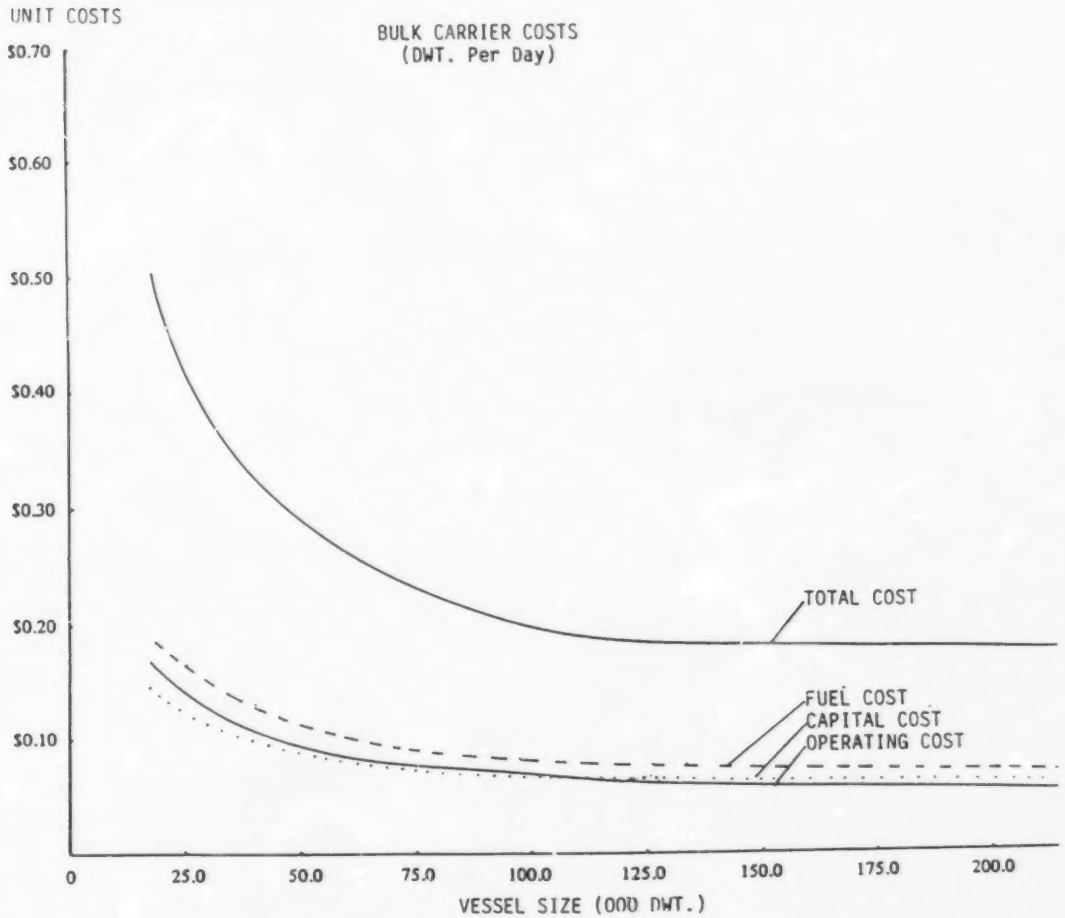
In circumstances where physical limitations do not exist, facility expansion may well provide economics of scale where volume of material handled is available in larger increments.

Vessel Size

In simplistic terms, large ships are only slightly more capital intensive than smaller ships due to:

(i) diminishing construction costs as size increases,

(ii) diminishing daily variable costs as dwt. increases (fuel and operational costs).



Of the total operating costs for all tonnage ranges, capital cost, operating costs, and fuel costs each represent about one-third of the total. (This assumes an oil price about $20 USD per barrel, finance costs at about 9% and a mean vessel age of about seven years.)

The following illustrates the costs associated with incremental increases in vessel size and amounts of material handled for shipment. The figures are based on the expansion of an iron ore discharge berth.

INCREMENTAL PORT DEVELOPMENT COSTS
($ Per Ton of Throughput)

From (000 dwt.)		25.0	50.0	75.0	100.0	125.0	150.0	175.0
To (000 dwt.)								
1.3*	25.0	--	--	--	---	---	---	---
2.6*	50.0	0.61	--	--	---	---	---	---
3.9*	75.0	0.69	0.41	--	---	---	---	---
5.2*	100.0	0.76	0.55	0.34	---	---	---	---
6.5*	125.0	0.79	0.65	0.48	0.29	---	---	---
7.8*	150.0	0.80	0.70	0.59	0.43	0.26	---	---
9.1*	175.0	0.85	0.73	0.66	0.54	0.40	0.24	---
10.4*	200.0	0.91	0.80	0.69	0.61	0.51	0.37	0.23
11.7*	225.0	1.03	0.92	0.82	0.71	0.59	0.49	0.36

* Throughput (Million Tons)

3.5 SHIP TYPE

Most export commodities from Nova Scotia shipped in solid bulk form are transported by self-discharging ships from 9000 dwt. to 50,000 dwt. capacity. This includes salt, aggregate and gypsum as well as a portion of the coal export. Gypsum is generally carried in company-owned ships or in time-chartered vessels with small increments shipped by spot shipments. Most of the vessels in this trade are equipped with short discharge conveyors located near the stern of the ship which discharge into a specially designed receiving hopper. This system limits the capacity of such vessels to engage in the carriage of other products. Salt, aggregate, and coal are carried by "Canadian" type self-unloading ships equipped with discharge booms capable of reaching 200 feet or more to a stockpile area. These vessels are highly versatile and can discharge at rates from 2000-6000 tonnes/hour with total cargo capacity usually in the 30,000 tonne range. Some vessels of this type lift as little as 9,000 tonnes while others have a capacity in excess of 50,000 tonnes. In general, self discharging ships are designed to optimize material handling speeds thereby shortening turn around time. Consequently, they are employed on short to medium distance transit routes.

Standard bulk carriers with strengthened holds and multiple wide hatches may be equipped with cranes for discharging or may be gearless. The latter are dependant on shoreside unloading equipment. These vessels range in size from a few hundred tonnes to 350,000 tonnes. The optimum size depends on the economics of the vessel as well as the volume of cargo and shoreside capacities at point of loading and discharge.

Although limited in its application in this region, tug and barge transport is employed extensively to move bulk products in other parts of the world. Wood pulp, paper products, petroleum products and aggregates are exported by this method from Atlantic Canada. The major detriment to barge transport is time loss from severe weather conditions and slower transit speed than ships. However, these negatives may be offset by lower levels of capitalization and lower tonne/operating costs. Technological advances in the tug and barge area may well result in it becoming the primary mode of carrying low freight bearing commodities over short to medium distance routes.

Therefore, the type of ship to be used in conveying any bulk product will be the type offering the most favorable costs in relation to the entire transport system to be employed.

3.6 OCEAN TRANSPORT

The volume of cargo to be carried will determine the most effective type of shipping arrangement. Shippers, when seeking a carrier for a parcel lot (fixed amount of cargo constituting a relatively small portion of a full vessel load), often have little response or simply replies of "no interest" by ship owners. Ship owners are disinclined to make geographic deviations for less than full cargos especially where the cargo requires out of the ordinary stowage arrangements or possesses any degree of incompatibility with other cargo carried. Small parcels as well require great amounts of time and expense on the broker's part with insufficient compensation. High density, low stowage factor cargo (25ft/ ton or less) are preferred as they can be overstowed with low density cargo putting the ship in a stable sea going condition as well as making the vessel "comfortable" at sea resulting in shorter steaming time, low fuel consumption and minimal vessel stress when at sea.

Parcel lots are well suited to some trades as complementary cargos. As many vessels are now moving forest products from North America to Europe, high density "bottom cargos" are desirable by the carriers. Therefore, knowledge of shipping patterns in the area is essential to obtain the best freight rate.

3.7 METHODS OF TRANSPORT

The following methods of transport apply to sufficiently large volumes of a commodity which constitutes a full vessel cargo or part of a full multi-cargo movement.

(i) Spot freight shipment - simply quoted on a cost per tonne basis with specified lay days and demurrage.
(ii) Contract (term) often called a C.O.F. (contract of affreightment) - quantity of freight and the time period are specified with quotes on cost per tonne basis.
(iii) Time charter - shipper essentially hires the vessel for a specified time and price is fixed per period. Shipper must also pay additional expenses - fuel, port fees, canal dues, insurance, management fees, berthing fees, etc. This requires shipper expertise.
(iv) Ownership - shipper owns vessels singularly or jointly with a ship owner, the latter having ship owner/operator experience.

Due to the recent depression in shipping, vessel's time was limited in value; consequently, as the cycle recovers, ship's time will become more valuable with owners demanding faster turn around and minimal port delay.

The steel market (constituents-ore, coal, and limestone) and the grain trades form the backbone of the international bulk freight market. Fluctuations in these markets immediately similarly impact the bulk freight market. In the 1980's there has been a trend whereby power stations and cement works have switched from oil to coal thermal processes, especially with the decrease in the number of nuclear powered plants worldwide which began in the mid-late 1970's. Movements of coal have consequently increased. Historical coal routes have altered as well with increased demand for low sulphur coal in the face of environmental concern. This has been at the expense of high sulphur coal. Technology may soon develop an economic method of subduing sulphurous emissions, and we may see a reversion to the original coal flow.

As freight rates improve quickly, one must ask if the improvement is based on artificial facts such as a poor USSR grain harvest, Persian Gulf tension, strikes etc. or by real changes in the market.

4. TRENDS IN MARINE FREIGHT MARKETS

4. TRENDS IN MARINE FREIGHT MARKETS

4.1 FREIGHT RATE TRENDS

The state of the world economy determines the world requirement for shipping services.

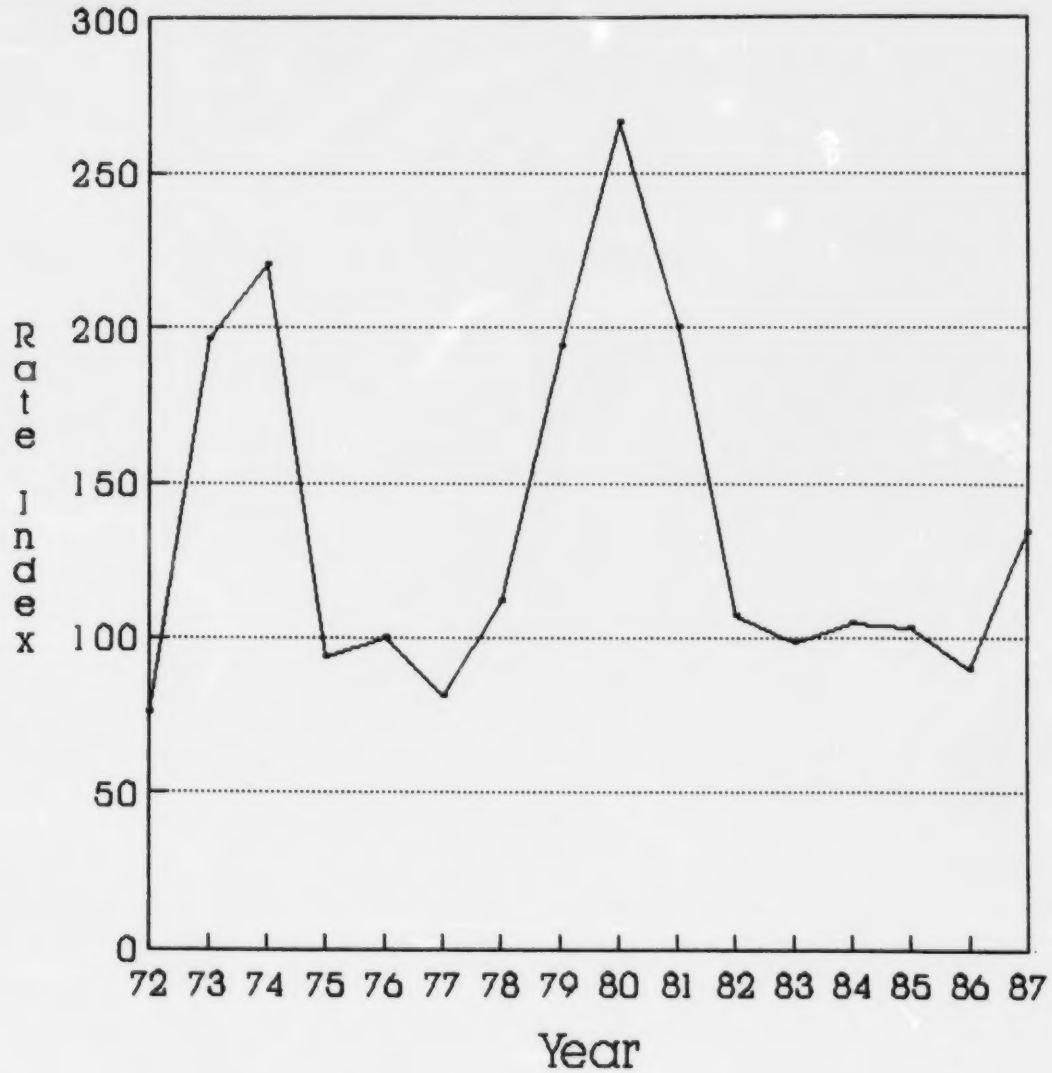
Economic upheaval directly affects world shipping costs. The 1973 Middle East war and oil initiative caused freight rates to more than double within a year. The easing of tension in 1974-75 saw a return to lower rates although somewhat higher than 1972 prices. In 1979, the second oil shock occurred and the Khomeini regime came to power in Iran. The consequence was another dramatic rise in freight rates which was sustained through 1980 augmented by the closure of Polish coal mines and the rise of the Solidarity movement. This created congestion at Hampton Roads and the Panama Canal. Inflation fueled the fire. The advent of high global interest rates, increasing third world debt, and recession caused rates to plummet in 1982. This low rate trend was sustained as bulk shipping capacity swelled due to delivery of new vessels ordered in the halcyon days of 1981-82. Simultaneously, some nations desirous of being shipbuilding nations, especially those in the far east (Japan and Korea), encouraged new building with attractive fiscal policies extended to the yards and owners (cheap finance and subsidies). Overcapacity resulted in depressed rates to ship owners and operators. This forced marginal operators out of business and prompted mergers, rationization, scrapping of older tonnage and eventually, restraint by the shipbuilding nations. The rate increase which began in late 1986 with a dramatic rise in 1987 and early 1988 indicates what many owners feel is the recovery from the long cycle of depressed rates.

The following graphic analysis depicts the freight rate fluctuations and events which precipitated these events. An analysis of rates over the same period for bulk product movements in and out of the Maritime provinces of Canada follows and demonstrates the parallel between general international rates and rates applying to this region.

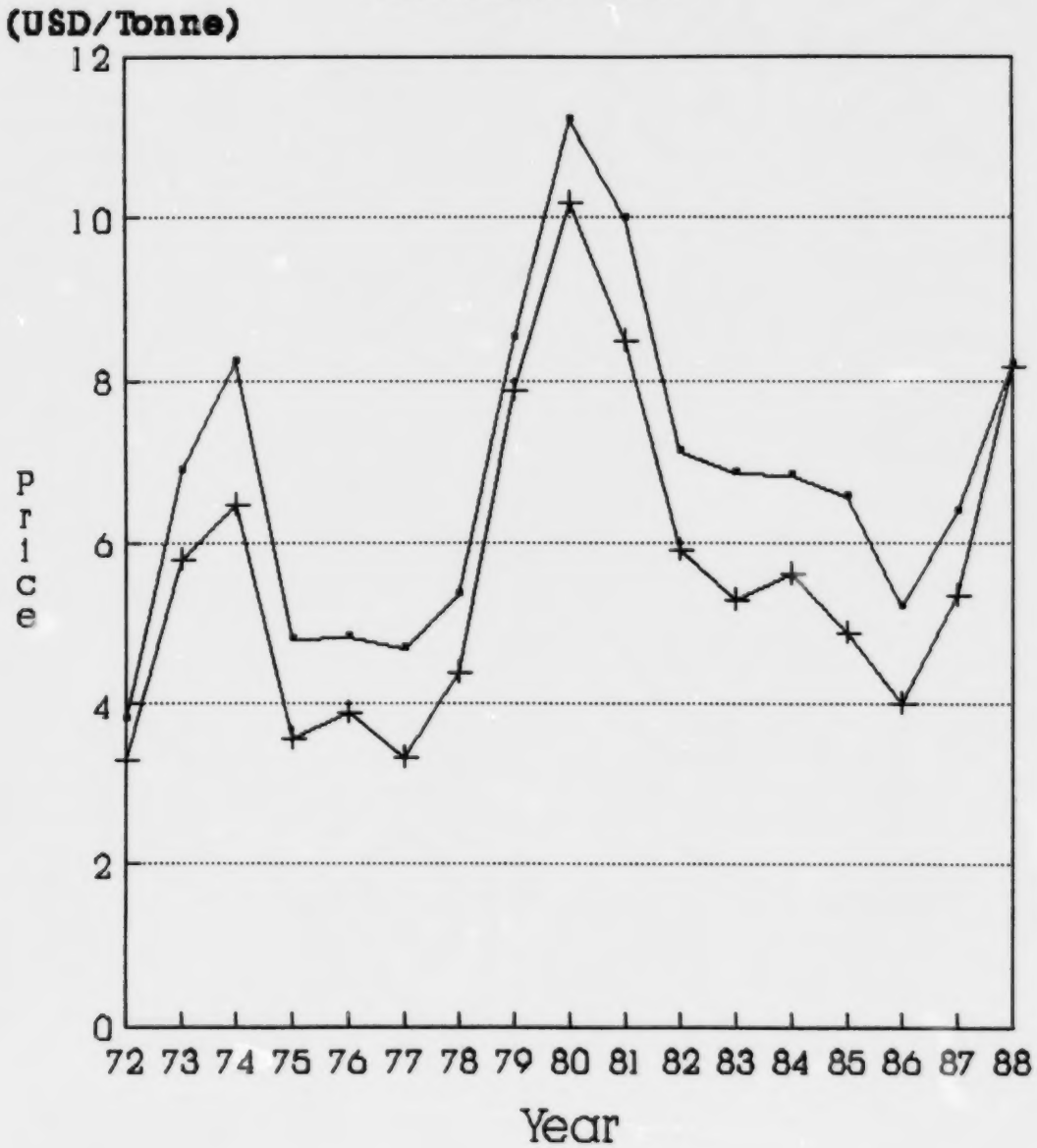
The following are reconstructed rates (nominal figures for each year) and include fuel costs, pilotage, port costs and stevedoring costs (prevailing level for each year). Rates are based on time charter contracts.

FREIGHT RATE INDEX
Worldwide Tramp Vessels

(all sizes combined 1976-100)



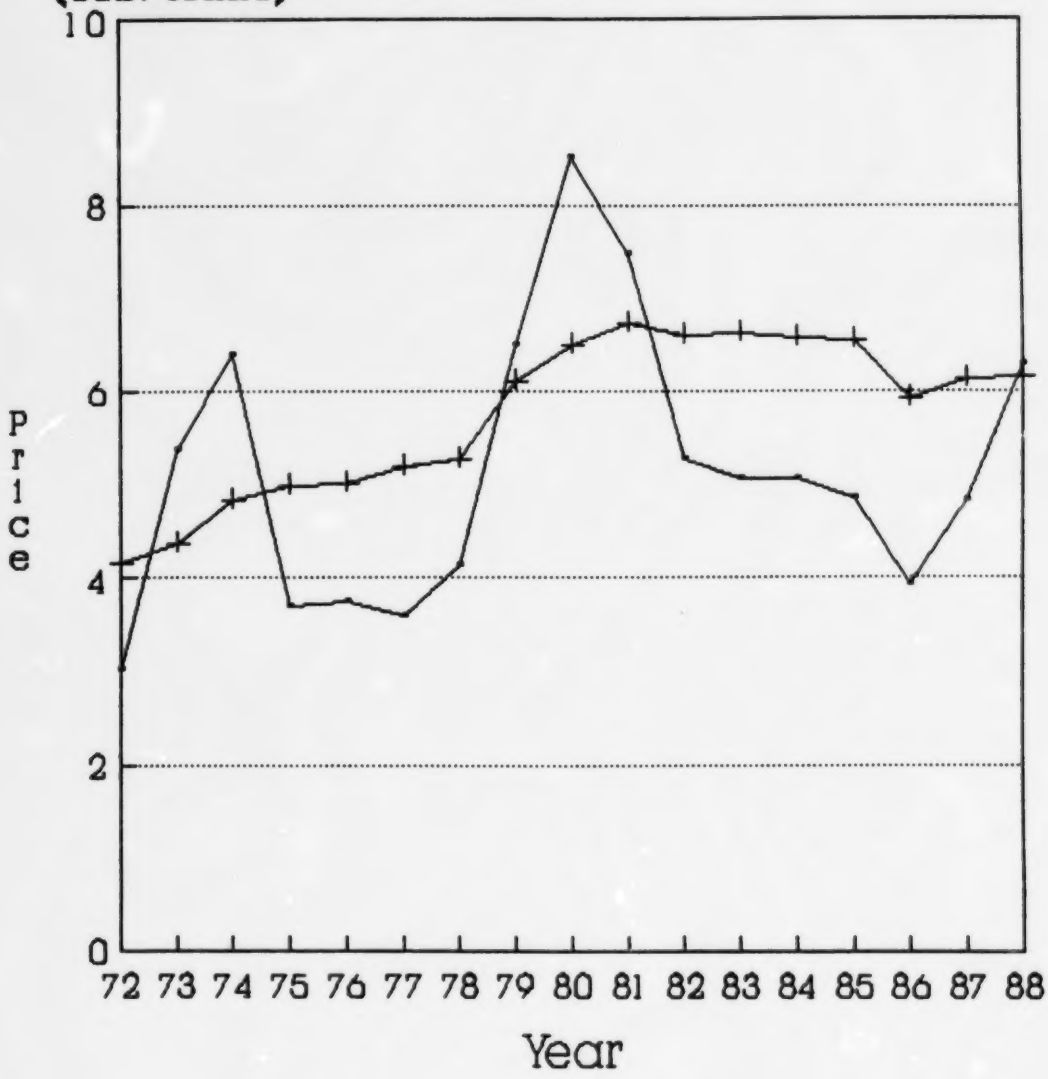
COAL
Calculated Rates



GYPSUM

Maritimes (primarily Nova Scotia) to U.S. East Coast

(USD/Tonne)



time charter primarily self unloaders

company owned and operated self unloaders

4.2 WORLD FLEET TRENDS

In 1987, we witnessed a resurgence of interest in building contracts for bulk carriers with 3.8 million dwt. ordered. Over 70% of the orders were of Panamax size. Renewed interest by owners in building bulkcarrier tonnage has been prompted by numerous factors including:

- -A dramatic increase in prices of secondhand vessels of recent vintage.
- -The general aging of the world fleet as a whole.
- -A general attitude of confidence in the world economy as markets recover steadily from the October 1987 stock crash.
- -A decrease in world shipbuilding capacity especially in Japan coupled with an apparent attitude of restraint by the Japanese state in unrealistic support for that country's shipbuilding industry.
- -Response to increased labour costs in the shipbuilding industry as a result of labour unrest in Korea (September 1987) and Poland (1988) in the shipbuilding sector.
- -Favorable economics in large volume movements of bulk materials as port capacities increase and new deep draft load centers come on stream.

For the first sustained period since 1973, 1986-1987 saw the new building market parallel the freight markets. The world fleet of ore and bulk carriers in commercial trades increased by 1.1 million gross tonnes representing 32.9% of total world commercial shipping capacity. This increase was stimulated by finalization of a contract by Japan's steel mills to purchase 20 million tons of Brazilian iron ore annually for 10 years. The result was increased volume building orders of bulk carriers over 140,000 dwt.

4.3 BACKHAUL POTENTIAL

Bulk product imports may provide some potential for export commodities shipped as backhaul. The three most common imported commodities in the Atlantic region are salt, phosphate rock and coal.

Salt is imported for fish processing purposes to numerous locations from Spain, the Mediterranean and Caribbean Islands. Movements average about 35,000 tonnes per year and are by small foreign-flagged vessels (less than 10,000 tonnes) with no fixed rotation.

Averaging about 60,000 tonnes per year, coal, in the form of coke, enters the region from the U.S. Great Lakes region and U.S. East Coast to Mulgrave, Nova Scotia and Long Harbour, Newfoundland with small amounts to other ports. These movements are erratic and transport is usually by ocean-going self-unloaders (30,000 tonnes upward).

Phosphate rock for use in the fertilizer industry averaging about 650,000 tonnes per year is imported primarily to Long Harbour, Newfoundland and Belledune, N.B. by ocean-going self-dischargers.

The coal and phosphate north-bound movements are often coupled with south-bound slag (backhaul) from Newfoundland or aggregate (backhaul) from the Strait of Canso.

4.4 TRENDS IN SUMMARY

In summary, the following trends have emerged.

- -Although world bulk shipping tonnage (total capacity) has not changed to any great degree, the increase in larger vessels has resulted in a reduction in the total number of vessels in bulk trades especially in the lower tonnage sizes.

- -The freight rate recovery which began in 1986 indicates the end of a long deep rate depression resulting in more realistic rates to owners but higher rates to shippers.

- -With the overall increase in vessel size, access to markets having physical or regulatory limitations is restricted. This includes many of the U.S. East coast and Gulf ports.

- -Given the advanced age of the total world fleet, rate increases may well be sustained until technologically advanced new ships enter the market which will take a minimum of three years.

TABLES

DISTANCES (Nautical Miles)

SYDNEY, NOVA SCOTIA, TO:

Boston, Massachusetts	600
Bristol, England	2,278
Cape Town, South Africa	6,423
Charleston, South Carolina	1,291
Charlottetown, Prince Edward Island (via Cabot Strait)	216
Chatham, New Brunswick	273
Cherbourg, France	2,344
Churchill, Manitoba	2,001
Colon, Panama	2,481
Dalhousie, New Brunswick	323
Digby, Nova Scotia	494
Gaspe, Quebec	260
Gibraltar	2,519
Grassy Bay, Bermuda	908
Habana, Cuba	1,817
Halifax, Nova Scotia	249
Jacksonville, Florida	1.453
Kingston, Jamaica	1,981
Lewisporte, Newfoundland (via Strait of Belle Isle)	556
Liverpool, England	2,311
Liverpool, Nova Scotia	293
Lisbon, Portugal	2,275
London, England	2,560
Nassau, Bahamas	1,562
New London, Connecticut (via Nantucket Sound)	680
Newport, Rhode Island (via Nantucket Sound)	645
New York, New York (south of Nantucket Shoals)	807
Norfolk, Virginia	996
Philadelphia, Pennsylvania (south of Nantucket Shoals)	956
Pictou, Nova Scotia (via Cabot Strait)	216
Ponta Delgada, Azores	1,616
Portland, Maine	560
Port Hawkesbury, Nova Scotia	125
Port of Spain, Trinidad	2,189
Reykjavik, Iceland (via Strait of Belle Isle)	1,684
St. George's Harbour, Newfoundland	169
Saint John, New Brunswick	511
St. John's, Newfoundland	378
San Juan, Puerto Rico	1,733
Savannah, Georgia	1,367
Southampton, England	2,379
Yarmouth, Nova Scotia	419

DISTANCES (Nautical Miles)

STRAIT OF CANSO, PORT HAWKESBURY, NOVA SCOTIA, TO:

Boston, Massachusetts	501
Bristol, England	2,321
Cape Town, South Africa	6,417
Charleston, South Carolina	1,192
Charlottetown, Prince Edward Island	104
Chatham, New Brunswick	225
Cherbourg, France	2,387
Churchill, Manitoba	2,075
Colon, Panama	2,388
Dalhousie, New Brunswick	286
Digby, Nova Scotia	395
Gaspe, Quebec	244
Gibraltar	2,558
Grassy Bay, Bermuda	821
Habana, Cuba	1,718
Halifax, Nova Scotia	160
Jacksonville, Florida	1,354
Kingston, Jamaica	1,888
Lewisporte, Newfoundland (east of Newfoundland)	650
Lisbon, Portugal	2,314
Liverpool, England	2,347
London, England	2,603
Montreal, Quebec	717
Nassau, Bahamas	1,465
New London, Connecticut (via Nantucket Sound)	581
Newport, Rhode Island (via Nantucket Sound)	546
New York, New York (south of Nantucket Shoals)	708
Philadelphia, Pennsylvania (south of Nantucket Shoals)	857
Pictou, Nova Scotia	70
Ponta Delgada, Azores	1,645
Portland, Maine	461
Port of Spain, Trinidad	2,106
Reykjavik, Iceland (via Strait of Belle Isle)	1,825
St. George's Harbour, Newfoundland	257
Saint John, New Brunswick	420
St. John's, Newfoundland	421
San Juan, Puerto Rico	1,646
Savannah, Georgia	1,268
Southampton, England	2,422
Sydney, Nova Scotia	125
Yarmouth, Nova Scotia	320

DISTANCES (Nautical Miles)

HALIFAX, NOVA SCOTIA, TO:

Amsterdam, Netherlands	2,791
Argentia, Newfoundland	448
Baltimore, Maryland	911
Belfast, Ireland	2,335
Boston, Massachusetts	380
Botwood, Newfoundland	754
Bridgetown, Barbados	1,906
Buenos Aires, Argentina	5,731
Cape Town, South Africa	6,492
Charleston, South Carolina	1,077
Charlottetown, Prince Edward Island (via Strait of Canso)	268
Cherbourg, France	2,507
Churchill, Manitoba (via Strait of Belle Isle)	2,210
Colon, Panama	2,295
Dakar, Senegal	2,956
Dalhousie, New Brunswick (via Strait of Canso)	488
Digby, Nova Scotia	278
Dublin, Ireland	2,404
Gibraltar	2,671
Glasgow, Scotland	2,384
Habana, Cuba	1,614
Hamburg, Germany	3,027
Hamilton, Bermuda	756
Jacksonville, Florida	1,255
Kingston, Jamaica	1,795
Lewisporte, Newfoundland (via east of Newfoundland)	772
Lisbon, Portugal	2,436
Liverpool, England	2,448
London, England	2,723
Miami, Florida	1,413
Montevideo, Uruguay	5,617
Montreal, Quebec (via Strait of Canso)	895
Montreal, Quebec (via Cabot Strait)	955
Nassau, Bahamas	1,360
Newport, Rhode Island (via south of Nantucket Shoals)	476
New York, New York (via south of Nantucket Shoals)	593
Norfolk, Virgina	790
Philadelphia, Pennsylvania	746
Pictou, Nova Scotia (via Strait of Canso)	236
Plymouth, England	2,416
Ponta Delgada, Azores	1,755
Port of Spain, Trinidad	2,059
Portland, Maine	338
Recife, Brazil	3,558

HALIFAX, NOVA SCOTIA TO:

Reykjavik, Iceland	1,941
Rio de Janeiro, Brazil	4,630
Saint John, New Brunswick	278
St. John's, Newfoundland	531
San Juan, Puerto Rico	1,580
Savannah, Georgia	1,150
Southampton, England	2,542
Sydney, Nova Scotia	249
Yarmouth, Nova Scotia	203

WHARFAGE CHARGES

Description	Unit Basis	Rate in Dollars
All goods not otherwise specified:		
(a) with a cubic content of less than 1m per tonne.....	tonne	$1.25
(b) with a cubic content equal to or greater than 1m per tonne.....	cubic metre	1.01
Cement		
(a) in bulk.....	tonne	.45
(b) in containers.....	tonne	.60
Coal.....	tonne	.31
Fertilizer.....	tonne	.45
Grain, grain products, hay.....	tonne	.39
Ores, alum, barites, sulphur, salt cake, rock, salt, soda ash, calcium chloride.....	tonne	.45
Ore concentrates.....	tonne	.75
Salt		
(a) for fish curing.....	tonne	.19
(b) other.....	tonne	.45
Sand, stone, gravel.....	tonne	.31

STORAGE CHARGES

Description	Unit Basis	Rate in Dollars
Storage for goods in sheds other than frost-proof sheds:		
(a) for the first 30 days...	square metre per day	$ .13
(b) for the next 90 days....	square metre per day	.13
Storage for goods on wharf.....	square metre per day or part thereof	.06
Storage for good on wharf approaches.....	square metre per day or part thereof	.04

BERTHAGE CHARGES

Description	Unit Basis	Rate in Dollars
1. Berthage charge on a vessel mooring, other than a vessel described in Item 2, at any float		
(a) per day or part thereof.....	Metre of length	$ .60
(b) per month.....	Metre of length	13.91
2. Berthage charge on a licensed Canadian commercial fishing vessel mooring		
(a) on holidays, per day or part thereo.....	Metre of length	.05
(b) on days other than holidays, per day or part thereof.....	Metre of length	.11
(c) per month.....	Metre of length	2.41
3. Berthage charge on a vessel loading or unloading or engaged in other commercial activity elsewhere than at a float		
(a) ferry vessel or vessel engaged in the coasting trade of Canada		
(i) not over 45m in length		
A. per hour or part thereof.....	Metre of length	.04
B. Maximum per day.....	Metre of length	.40
(ii) over 45m but not over 100m in length		
A. per hour or part thereof.....	Metre of length	.05
B. Maximum per day.....	Metre of length	.60

Description	Unit Basis	Rate in Dollars
(iii) over 100m in length		
A. per hour or part thereof	Metre of length	.06
B. Maximum per day	Metre of length	.71
3. (b) vessel other than one described in paragraph (a), per day or part thereof	Metre of length	.88
4. Berthage charge elsewhere than at a float, on a vessel not engaged in loading, unloading or other commercial activity, per day or part thereof		
(a) on holidays	Metre of length	.06
(b) on days other than holidays	Metre of length	.11
5. Minimum berthage charges for a vessel described in		
(a) paragraph 3(a)	Per vessel	9.20
(b) paragraph 3(b)	Per Metre of length	.88

UTILITIES AND MISCELLANEOUS CHARGES

Description	Rate
Electricity, water, and miscellaneous services not otherwise specified	Cost plus 20%
110 volt single phase	$1.25 per day or portion thereof
220 volt single phase	2.50 per day or portion thereof
220 volt three phase	14.40 per day or portion thereof
550 volt three phase	42.00 per day or portion thereof

ATLANTIC PILOTAGE AUTHORITY
RATES AND FEES FOR NOVA SCOTIA

Area	Basic Charge	Unit Charge	Min Charge	Max Charge	Movage	Misc. Charge
Cape Breton (Sydney)	$318.32	$2.37			$318.32	See (1) below
Bras d'Or Lakes	289.38	2.19			318.32	
Strait of Canso	370.41	2.19		$3,500.34		
Strait of Canso (One way transit)			$882.03	882.03	486,16	See (2) below
Halifax	187.32	1.32	227.05		238.40* (min.)	
Pugwash	237.30	3.70			260.45	
Pictou	222.60	2.23	222.60		180.31	
Other Ports	233.73	2.53	233.73	361.73	189.21	See (3) below

(1) $80.00 is added to the basic charge each time a pilot boat is used in a compulsory pilotage area. Halifax is the exception.

(2) $55.00 is added to the basic charge each time the pilot is used.

(3) Maximum of $361.73 per 24 hour period.

*A movage in Halifax is 90% of the basic plus unit charges if a pilot is used; otherwise 80%.

Misc.

-One way transit of the Canso Lock or St. Peter's Lock $136.58.

-Use of a portable VHF radio when the ship is not so equipped is subject to a charge of $23.15.

-Ship trial movements are charged $131.12 for the first 3 hours and $43.98 per each additional hour.

-When a pilot is detained onboard a ship for reasons other than weather, there is no charge for the first hour; $45.15 for the second hour and $23.15 for each additional hour up to a maximum of $299.80 per 24 hour period.

-When a pilot is detained on shore for more than 1 hour, then

$23.15 for each additional hour up to a maximum of $228.03 per 24 hour period.

-Reasonable travel expenses incurred by the pilot resulting directly from his assignment to pilot the ship are chargeable.

-Where the pilot is carried beyond the area for which he is licenced, a charge of $208.354 per 24 hour period is levied. The rate is $113.43 for non-compulsory pilotage areas.

-Dead ships are moved at twice the normal pilotage rate.

-Pilots providing ship safety watches are charged at $409.76 per 15 hour period.

-When a pilot is cancelled after reporting for duty, a charge of $104.18 is payable. If the cancellation occurs more than 1 hour after the pilot reported for duty, an additional $28.94 is charged for each additional hour.